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[Claim(s)]
[Claim 1]
A circuit board,
An image sensor connected on the above-mentioned circuit board,
A holder which it is carried on the above-mentioned circuit board, and surrounds the above-mentioned image sensor,
A lens holder which it is provided in the above-mentioned holder so that movement to an optical axis direction is possible, and is provided with an optical lens which carries out image formation to the above-mentioned image sensor,
It has a case which stores the above-mentioned circuit board, the above-mentioned image sensor, the above-mentioned holder, and the above-mentioned lens holder,
A lateral surface of the above-mentioned circuit board and the above-mentioned holder is covered by an elastic member,
Either the above-mentioned holder or the above-mentioned lens holder was energized by the above-mentioned optical axis direction via the above-mentioned elastic member, and it is in contact with the above-mentioned case. [at least]
A solid imaging device characterized by things.
[Claim 2]
A solid imaging device, wherein the above-mentioned case has a positioning means of the above-mentioned elastic member in Claim 1.
[Claim 3]
A solid imaging device currently having formed the above-mentioned elastic member in one in Claim 1 or 2.
[Claim 4]
In one one of the Claims 1-3, the above-mentioned circuit board contacts other circuit boards via the above-mentioned elastic member,
The above-mentioned circuit board and other circuit boards are electrically connected by zebra rubber.
A solid imaging device characterized by things.
[Claim 5]
A solid imaging device currently having formed the above-mentioned zebra rubber in one with the above-

mentioned elastic member in Claim 4.
[Claim 6]
In one one of the Claims 1-3, the above-mentioned elastic member has conductivity,
The above-mentioned circuit board contacted other circuit boards via the above-mentioned elastic member, and is electrically connected by this elastic member.
A solid imaging device characterized by things.
[Claim 7]
A solid imaging device currently having formed the above-mentioned elastic member with zebra rubber in Claim 6.

[Detailed Description of the Invention]
[0001]
[Field of the Invention]
This invention relates to the solid imaging device carried in portable devices, such as a cellular phone and a notebook PC.
[0002]
[Description of the Prior Art]
Nowadays, carrying a small solid imaging device in portable devices, such as a cellular phone, and transmitting and receiving the picture picturized with this solid imaging device and an image prospers. Although this solid imaging device usually carried image sensors, such as CCD, on the circuit board and the composition which carries out image formation to this image sensor with an optical lens is adopted, the screw mechanism etc. are usually performing initial adjustment of the focus. In order to perform a proximity image pick-up etc., there is much what enables movement of the lens holder holding an optical lens to an optical axis direction, and can change a focal length.
[0003]
However, since the eccentricity of an optic axis and a gap of a focal length arise by the gap (play) of a male screw and the female screw screwed in this when movement of a lens holder to an optical axis direction is enabled according to a screw mechanism etc., a means to prevent this is proposed (for example, patent documents 1). That is, image formation of this solid imaging device is carried out to the image sensor carried on the circuit board with the optical lens attached to the lens holder, and this lens support part is screwed in the holder provided on this circuit board with the screw. Therefore, adjustment and change of the focal length are attained by rotating a lens holder to a holder.
[0004]
And the opening is cut and lacked on a part of circumference of the holder, a press contact member is inserted in this opening, and it is welded by pressure to the male screw 15 of the lens support part 16 with the blade spring. Therefore, since the male screw of a lens holder and the female screw of a holder are mutually welded by pressure by a press contact member, they can prevent the eccentricity of an optic axis, and a gap of a focal length from play of a screw being lost and arising.
[0005]

[Patent documents 1]

JP,2000-41167,A (the one - 5th page, Fig. 2)

[0006]

[Problem to be solved by the invention]

However, there was the following problem in the conventional solid imaging device. That is, the attachment to the portable device of a solid imaging device attached the circuit board of the solid imaging device to the circuit board by the side of a portable device, etc., was made to usually fit into the opening which provided the lens holder and the holder in the case of the portable device, and it had equipped with it. However, it is walking around with the portable device, and when it drops carelessly or something is thrown, there is a possibility of making an excessive shock transforming a direct intermediary rate and the solid imaging device itself into a lens holder or a holder from the fitting portion of the opening of a case, or making it damaging. There is also a possibility that the focus position adjusted the first stage and the changed focal length position may shift according to this impact load. Therefore, in the focus position adjusted the first stage and the changed focal length position, it is necessary [it] for a solid imaging device to keep an excessive shock from being added, keeping the eccentricity of an optic axis, and a gap of a focal length from arising.

[0007]

Then, the excessive shock produced [1st] in the portable device is kept from being added, and the purpose of this invention is to provide the solid imaging device kept the eccentricity of the optic axis of an optical lens, and a gap of a focal length from 2nd producing in the initial adjustment position and movable focal position of a focus.

[0008]

[Means for solving problem]

There is in having stored in the case of a portable device etc. that the above-mentioned technical problem should be solved, the 1st feature of the solid imaging device by this invention covering the lateral surface of a solid imaging device by an elastic member, and energizing a lens holder etc. to an optical axis direction via this elastic member. Namely, a solid imaging device is carried a circuit board, the image sensor connected on this circuit board, and on this circuit board, and. It has a case which stores the holder which surrounds this image sensor, the lens holder which it is provided in this holder so that movement to an optical axis direction is possible, and is provided with the optical lens which carries out image formation to this image sensor, and this circuit board, this image sensor, this holder and this lens holder. And the lateral surface of the above-mentioned circuit board and the above-mentioned holder is covered by the elastic member, either this holder or this lens holder was energized by the optical axis direction of the above-mentioned optical lens via this elastic member, and it is in contact with the above-mentioned case. [at least]

[0009]

Thus, the following operation effect can be obtained by constituting an invention. Since the solid imaging device is attached to the 1st via the elastic member at the case and an elastic member eases a shock even if impact load is applied to a case, breakage or modification can be prevented from excessive impact load being applied to the solid imaging device itself, and arising. The focus position and the changed focal length position of the lens which the elastic member eased the shock to the 2nd, and was adjusted to it by the shock at least the first stage since either the holder or the lens holder was energized by the optical axis direction of the optical profitable lens by the elastic member can be prevented from shifting.

[0010]

If a lens holder is made 3rd to contact a case via an elastic member, rotation of a lens holder will be controlled by both frictional force. Therefore, for example, when a screw mechanism performs initial adjustment of a focus, the focal position adjusted the first stage can be prevented from a lens holder rotating and shifting. Therefore, the necessity of fixing a screw mechanism etc. with adhesives after initial adjustment of a focus is lost. If the lateral surface of a solid imaging device is covered to the 4th by an elastic member, a light sheilding and dust proofing are securable for it.

[0011]

There is a case which indicated the 2nd feature of the solid imaging device by this invention with the above-mentioned feature 1 in having a positioning means of the above-mentioned elastic member. That is, by providing a positioning means in a case, the attachment to the case of a solid imaging device becomes correctly and easy.

[0012]

There is an elastic member which indicated the 3rd feature of the solid imaging device by this invention with the above-mentioned feature 1 or 2 in having formed in one. That is, by forming in one, at easy and low cost, a solid imaging device can be covered by an elastic member, and a light sheilding and dust proofing can be collectively improved for it.

[0013]

The circuit board which indicated the 4th feature of the solid imaging device by this invention to one one of the above-mentioned features 1 thru/or 3 contacts other circuit boards via the above-mentioned elastic member, and this circuit board and other circuit boards have it in having electrically connected by zebra rubber. With zebra rubber, a metallic wire and thin foil were embedded for elastic materials, such as rubber, and it is widely used as parts for connection of electronic equipment here. That is, for example, if the zebra rubber of the letter of a block is inserted between electric points of contact, according to elastic power, the metal wire etc. which were exposed on the both-ends side of an elastic material will be pressed by both points of contact, and will electrically connect both this point of contact.

[0014]

Therefore, although a circuit board and other circuit boards are electrically connected by using the zebra rubber which has elasticity, while becoming easy, it becomes easy to store a solid imaging device in a case via an elastic member, energizing a lens holder etc. to an optical axis direction.

[0015]

There is zebra rubber which indicated the 5th feature of the solid imaging device by this invention with the above-mentioned feature 4 in having formed in one with the above-mentioned elastic member. It is in the elastic member one either of the above-mentioned features 1 thru/or 3 indicated the 6th feature of the solid imaging device by this invention to be having conductivity, and the above-mentioned circuit board having contacted other circuit boards via this elastic member, and having electrically connected by this elastic member. There is an elastic member which indicated the 7th feature of the solid imaging device by this invention with the above-mentioned feature 6 in having formed with zebra rubber.

[0016]

Thus, by constituting an invention, it becomes unnecessary to prepare separately the connecting member which electrically connects a circuit board, and a manufacturing cost decreases, and assembling work

becomes easy. Influence of the electric noise from the outside to a circuit board can be made hard to be influenced by covering a solid imaging device by the elastic member which has the conductivity of zebra rubber etc.

[0017]

[Mode for carrying out the invention]

The embodiment of the solid imaging device by this invention is described referring to drawing 1. Now, for example, the solid imaging device was electrically connected on the plate-like circuit board 1, the image sensor 8 which consists of CCDs is formed. The holder 2 is carried on the circuit board 1, and the rectangular pipe portion formed in the lower part of this holder is surrounding the image sensor 8. The upper part of the holder 2 is formed in the shape of [centering on an optic axis] a cylindrical shape, and the female screw 2a is screwed on the inner skin of this cylindrical section. And the male screw 3a screwed on the perimeter of the lens holder 3 is screwing in the female screw 2a. Therefore, movement to an optical axis direction is enabled by rotating the lens holder 3 to the holder 2. The optical lens 4 is being fixed to the center of the lens holder 3 by the lens control 5, and image formation of the photographic subject image is carried out to the image sensor 8. The light filter 6 is arranged at the holder 2 so that it may counter with the image sensor 8.

[0018]

Now, the circuit board 1, the image sensor 8 and the holder 2 which were carried in this circuit board, this holder, and the lens holder 3 which can move to an optical axis direction are stored by the case 12 of the portable device. The lateral surface of the circuit board 1, the holder 2, and the lens holder 3 is covered by the elastic member 10 which formed the rubber material in one, for example. And the elastic member 10 fits into the inner circumference of the projection part 12a of the shape of a cylindrical shape formed in the internal surface of the case 12, and is positioned. Here, elastic deformation of the elastic member 10 was carried out, and it is in contact with the case 12 so that the lens holder 3 may be energized to an optical axis direction. The crevice 12b centering on an optic axis was formed in the lateral surface of the case 12, the transparent acrylic board 13 fitted into this crevice, and damage and dirt of the optical lens 4 are prevented.

[0019]

The peripheral part of the circuit board 1 has fitted into the positioning part 10c which consists of a slot formed in the elastic member 10. For this reason, as for the circuit board 1 and the holder 2 carried on this circuit board, a relative position is decided via the elastic member 10. The lens holder 3 screwed in the holder 2 fits into the inner circumference of the projection part 12a of the shape of a cylindrical shape formed in the internal surface of the case 12 via the elastic member 10, and is positioned. Therefore, the relative position of the circuit board 1 to the case 12 will be decided via the inner circumference of the projection part 12a, and the positioning part 10c of the elastic member 10. The elastic member 10 can be prevented from separating from the circuit board 1.

[0020]

The circuit board 1 is carried on the circuit board 14 of everything but the portable device side via the elastic member 10. And the circuit board 1 and other circuit boards 14 are electrically connected with the elastic member 10 by the zebra rubber 10a formed in one. FPC11 is connected to the circuit board 1, and this FPC penetrates the ****** part 10b formed in the elastic member 10, and has connected it to other electric circuits (not shown).

[0021]

Next, the operation effect of the solid imaging device mentioned above is explained. The focal position where the optical lens 4 carries out image formation of the photographic subject changes for each imaging device of every with dimensional tolerance, assembly accuracy, etc. of each part article. Therefore, in order to carry out image formation to the image sensor 8 correctly, initial adjustment of a focus is needed in the case of the last assembly. Initial adjustment of this focus is performed by making the female screw 2a of the holder 2 rotate the lens holder 3 screwed with the male screw 3a, as mentioned above. However, since the lens holder 3 is always energized by the optical axis direction of the optical lens 4 according to the elastic power of the elastic member 10, it can prevent the eccentricity of an optic axis and the gap of an optical axis direction which are produced by the gap of the female screw 2a and the male screw 3a.

[0022]

A rotation is controlled by frictional force with the elastic member 10 to which the lens holder 3 intervenes between the cases 12. Therefore, for example, a gap of a focus can be prevented from the lens holder 3 rotating and occurring even if it does not do the troublesome work of fixing the female screw 2a and the male screw 3a with adhesives after focus adjustment. Since the lens holder 3 and the circuit board 1 are in contact with the case 12 and other circuit boards 14 via the elastic member 10, respectively and an elastic member eases a shock even if impact load is applied to this case, modification and breakage of the solid imaging device itself can be prevented. The focus position adjusted with the shock the first stage can be prevented from shifting. And by covering the lateral surface of a solid imaging device by the elastic member 10, a light sheilding and dust proofing are securable.

[0023]

Next, other embodiments of the solid imaging device by this invention are described, referring to drawing 2 and drawing 3. This solid imaging device moves the permanent magnet 122 provided in the perimeter side of the lens holder 103 to an optical axis direction with the electromagnet 123 which counters this, and usually enables change of the focal position of the optical lens 104 to an image pickup position and a proximity (henceforth "broad view") image pickup position. That is, for example, the solid imaging device was electrically connected on the plate-like circuit board 101, the image sensor 108 which consists of CCDs is formed. The holder 102 is carried on the circuit board 101, and the rectangular pipe portion formed in the lower part of this holder is surrounding the image sensor 108. The centering on optic axis cylinder [upper part / of the holder 102] slot 102a is formed, and the lower cylindrical section 103b of the lens holder 103 has fitted into this cylinder slot. The key which the unillustrated key groove along an optical axis direction was established in the cylinder slot 102a, and was provided in this key groove at the lower cylindrical section 103b and which is not illustrated is being engaged. Therefore, the relative displacement of the lens holder 103 has become possible to the holder 102 only in the optical axis direction of the optical lens 104.

[0024]

The optical lens 104 is being fixed to the center of the lens holder 103 by the ring shape lens control 105, and image formation of the photographic subject image is carried out to the image sensor 108. The light filter 106 is arranged at the holder 102 so that it may counter with the image sensor 108. The male screw 103a is screwed on the top perimeter of the lens holder 103, and the adjust ring 121 is screwing in this male screw. And the ring shape permanent magnet 122 is attached to the perimeter of the adjust ring 121. As shown in drawing 2, the permanent magnet 122 is magnetized for every field quadrisected in the direction of the

circumference so that the S pole and the N pole may be located in a line by turns.

[0025]

The electromagnet 123 is allocated in the circumference of the permanent magnet 122. And an upper end face and a peripheral face, and the lower end side and inner skin of the electromagnet 123 are covered with the 1st ring shape stator 124 that consists of magnetic bodies, respectively, and the 2nd stator 125. The 1st stator 124 and the 2nd stator 125 are being fixed to the flange 102b which protruded on the perimeter of the holder 102. The top projection part 124a is formed in the position of the two directions of the circumference which make an optic axis symmetrical at the 1st stator 124, and the N pole field of the permanent magnet 122 is countered. The lower projection part 125a is formed in the position which counters each projection part 124a of the 1st stator 124, the predetermined optical axis direction interval was separated in the 2nd stator 125, and the N pole field of the permanent magnet 122 is put between it.

[0026]

Now, each component parts mentioned above are stored by the case 112 of a portable device etc. The lateral surface of the circuit board 101, the holder 102, and the 1st stator 124 is covered by the elastic member 110 which has the conductivity which mixed conductive substances, such as a carbon fiber, in the rubber material, for example, and was formed in one. And the elastic member 110 fits into the inner circumference of the projection part 112a of the shape of a cylindrical shape formed in the internal surface of the case 112, and is positioned. The crevice 112b centering on an optic axis was formed in the lateral surface of the case 112, the transparent acrylic board 113 fitted into this crevice, and damage and dirt of the optical lens 104 are prevented. Here, elastic deformation of the elastic member 110 was carried out, and it is in contact with the case 112 so that the holder 102 may be energized to an optical axis direction via the electromagnet 123 and the 1st and 2nd stators 124 and 125.

[0027]

The peripheral part of the circuit board 101 has fitted into the positioning part 110c which consists of a slot formed in the elastic member 110. For this reason, as for the circuit board 101 and the holder 102 carried on this circuit board, a relative position is decided via the elastic member 110. The lens holder 103 which fits into the holder 102 fits into the inner circumference of the projection part 112a of the shape of a cylindrical shape formed in the internal surface of the case 112 via the elastic member 110, and is positioned. Therefore, the relative position of the circuit board 101 to the case 112 will be decided via the inner circumference of the projection part 112a, and the positioning part 110c of the elastic member 110. The elastic member 110 can be prevented from separating from the circuit board 101.

[0028]

The circuit board 101 is carried on the circuit board 114 of everything but the portable device side via the elastic member 110. And the circuit board 101 and other circuit boards 114 are electrically connected with the elastic member 110 by the zebra rubber 110a formed in one.

[0029]

Next, the operation effect of the solid imaging device mentioned above is explained. It is magnetized so that it energizes on the electromagnet 123, for example, may become the S pole about the 1st stator 124 and may become the N pole about the 2nd stator 125. [in this case the N pole field of the permanent magnet 122] Contact this top projection part by the power of absorption of the top projection part 124a (S pole) of the 1st stator 124, and the restitution of the lower projection part 125a (N pole) of the 2nd stator 125, and as

shown in drawing 3, [the lens holder 103] It is made to move to the position separated from the image sensor 108 to the optical axis direction, i.e., a macro image pickup position. When it is magnetized so that it energizes on the electromagnet 123 in the direction contrary to this, and may become the N pole about the 1st stator 124 and may become the S pole about the 2nd stator 125, [the N pole field of the permanent magnet 122] contacting this lower projection part by the restitution of the top projection part 124a (N pole) of this 1st stator, and the power of absorption of the lower projection part 125a (S pole) of this 2nd stator -- the lens holder 103 -- the position near an optical axis direction from the image sensor 108 -- that is, it is made to usually move to an image pickup position

[0030]

After making an N pole field of the permanent magnet 122 contact the top projection part 124a of the 1st stator 124, or the lower projection part 125a of the 2nd stator 125, Even if it intercepts current of an electromagnet, adsorption maintenance is carried out by magnetism of itself at these top projection parts or a lower projection part which is a magnetic body, and this permanent magnet can maintain each image pickup position by it. Initial adjustment of a focus performed in the case of the last assembly of a solid imaging device is performed by rotating the adjust ring 121 screwed in the lens holder 103. However, after initial adjustment is completed, it is necessary to fix the male screw 103a and a female screw with adhesives etc.

[0031]

Thus, since this elastic member eases a shock even if impact load is applied to this case by attaching a solid imaging device to the case 112 via the elastic member 110, modification and breakage of the solid imaging device itself can be prevented. By covering a lateral surface of a solid imaging device by the elastic member 10, a light sheilding and dust proofing are securable.

[0032]

Since the holder 102 and the circuit board 101 are in contact with the case 112 and other circuit boards 114 via the elastic member 110, respectively and an elastic member eases a shock even if impact load is applied to this case, modification and breakage of the solid imaging device itself can be prevented. The lens holder 103 can be prevented from usually shifting from an image pickup position and a macro image pickup position by a shock.

[0033]

Since the elastic member 110 has conductivity, the influence of the electric noise from the outside to a solid imaging device can be reduced, and also the influence of the magnetism from the electromagnet 123 on other external electronic parts can also be reduced.

[0034]

Since it has flowed through the circuit board 101 and other circuit boards 114 by the zebra rubber 110a, it can flow through both easily, without using the method of adhering and flowing through both, such as solder, for example, and when faults, such as failure, occur to both, both repair and exchange become easy.

[0035]

Although the elastic member 110 which mixes a carbon fiber in a rubber material and has conductivity was formed in one in this example, the elastic member 110 which has conductivity can be suitably changed not only in this. For example, the elastic member 110 may consist of zebra rubbers. Since the zebra rubber 110a for flowing through the elastic member 110 for easing a shock, the circuit board 101, and other circuit boards

114 can be constituted from same member if it does in this way, in addition to the above-mentioned effect of reducing the influence of an electric noise or magnetism, composition does not become complicated.

[0036]

It cannot be overemphasized that it changes suitably and can carry out in the range which this invention is not limited only to the above-mentioned embodiment, and does not change a gist.

[0037]

[Effect of the Invention]

Since the solid imaging device is attached to the 1st via the elastic member at the case and an elastic member eases a shock even if impact load is applied to a case, breakage or modification can be prevented from excessive impact load being applied to the solid imaging device itself, and arising. The focus position and the changed focal length position of the lens which the elastic member eased the shock to the 2nd, and was adjusted to it by the shock at least the first stage since either the holder or the lens holder was energized by the optical axis direction by the elastic member can be prevented from shifting.

[0038]

If a lens holder is made 3rd to contact a case via an elastic member, rotation of a lens holder will be controlled by both frictional force. Therefore, for example, when a screw mechanism performs initial adjustment of a focus, etc., an initial adjustment position can be prevented from a lens holder rotating and shifting. Therefore, for example, the necessity of fixing a screw mechanism etc. with adhesives after initial adjustment of a focus is lost. If the lateral surface of a solid imaging device is covered to the 4th by an elastic member, a light sheilding and dust proofing are securable for it.

[0039]

The attachment to the case of a portable device etc. becomes correctly and easy by 5th providing the positioning means of a solid imaging device in a case. By forming an elastic member in one, at easy and low cost, a solid imaging device can be covered by an elastic member, and a light sheilding and dust proofing can be collectively improved [6th] for it. Although a circuit board and other circuit boards are electrically connected by using the elastic member which has [7th] conductivity, while becoming easy, influence of the electric noise from the outside to a circuit board can be made hard to be influenced.

[Brief Description of the Drawings]

[Drawing 1]It is a sectional view of the solid imaging device with which this invention was applied.

[Drawing 2]It is an upper surface figure of other solid imaging devices with which this invention was applied.

[Drawing 3]It is a sectional view of other solid imaging devices with which this invention was applied.

[Explanations of letters or numerals]

1 and 101 Circuit board
2 and 102 Holder
2a Female screw
3 and 103 Lens holder
3a, a 103a male screw
4 and 104 Optical lens
5 and 105 Lens control
6, 106 light filters
8 and 108 Image sensor

10 and 110 Elastic member
12 and 112 Case
13, 113 acrylic boards
14 and 114 Other circuit boards
121 Adjust ring
122 Permanent magnet
123 Electromagnet
124 The 1st stator
125 The 2nd stator

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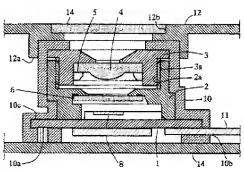
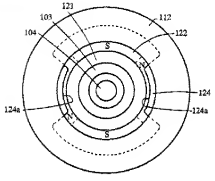
10 and 110 Elastic member
12 and 112 Case
13, 113 acrylic boards
14 and 114 Other circuit boards
121 Adjust ring
122 Permanent magnet
123 Electromagnet
124 1st stator
125 2nd stator

[Drawing 1]



[Drawing 2]



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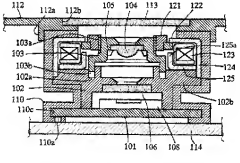

[Translation done.]